

**The U.S. Army Materiel Command Safety Reshape
and the Ammunition and Explosives Safety
Policy Action Committee (AMMOPAC)**

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CHART 1 -- Title



**HEADQUARTERS U.S. ARMY
MATERIEL COMMAND**

**SAFETY RESHAPE AND
THE AMMOPAC**



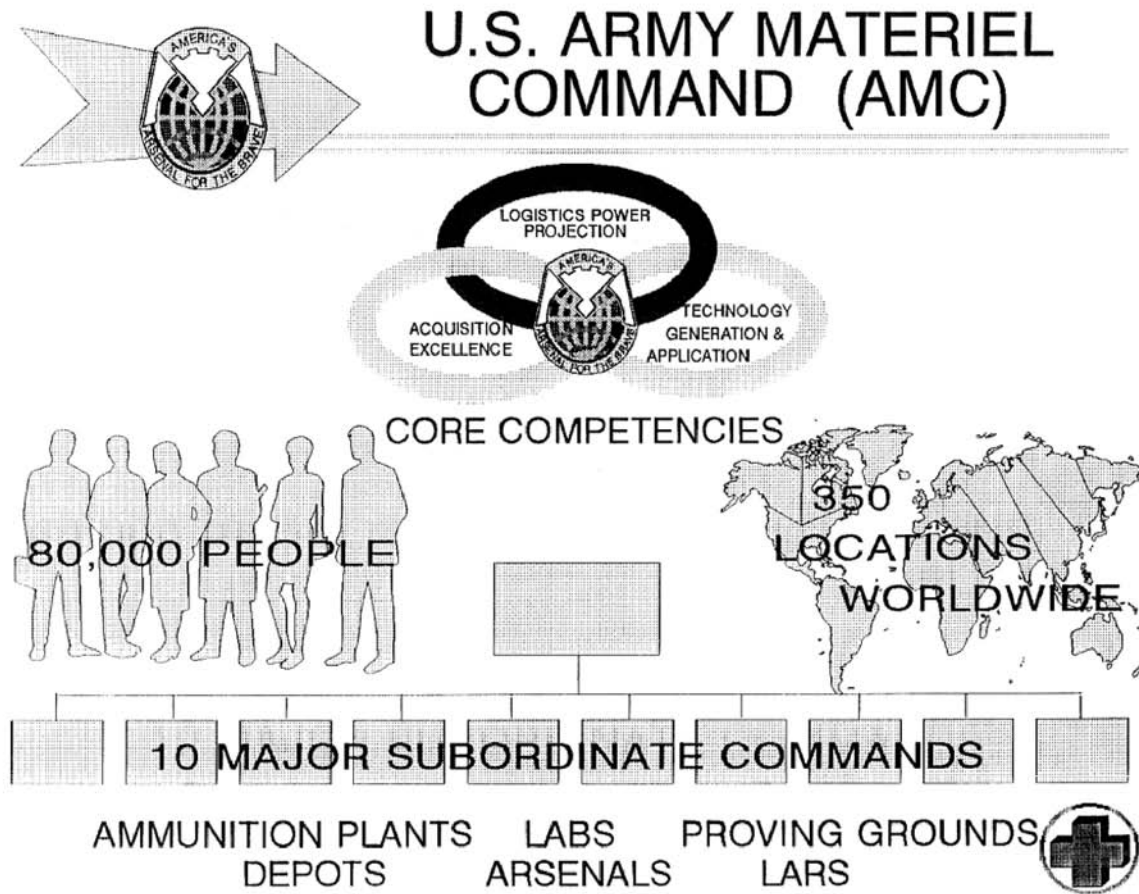
**TWENTY-SIXTH DEPARTMENT OF DEFENSE
EXPLOSIVES SAFETY SEMINAR**

17 AUGUST 1994

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This paper is a progress report and a success story. It summarizes substantial changes that have been implemented within the U.S. Army Materiel Command (AMC) safety program during the last year. These changes were necessitated by organizational consolidations, realignments, and closures connected with the downsizing of AMC since 1989.

CHART 2 -- AMC



The U.S. Army Materiel Command (AMC) is the principal materiel development, acquisition, and logistics organization of the U.S. Army, and serves the military services as the single manager for conventional ammunition. Today AMC employs just over 80,000 people. Over 90 percent of the work force consists of career civilian employees assigned to about 350 locations distributed among 40 states and 13 countries. AMC has 10 major subordinate commands (MSCs). Several MSCs manage the acquisition and logistics of their respective commodity groups, such as ammunition, missiles, tank and automotive materiel, or communications and electronic equipment. Other MSCs have missions that support the entire spectrum of AMC managed materiel with specific services such as basic and applied research, test and evaluation, or storage and maintenance. The MSCs direct the activities of numerous

ammunition plants, arsenals, depots, laboratories, proving grounds, and other installations and activities, as well as Logistics Assistance Representatives deployed with Army field units. The MSCs also contract extensively with private industry, not only to purchase Army materiel, but for significant mission services ranging from research to demilitarization and disposal of equipment and materials, including ammunition. This broad and complex mission is reflected by the three Core Competencies maintained by AMC: Acquisition Excellence, Logistics Power Projection, and Technology Generation and Application.

CHART 3 -- Safety

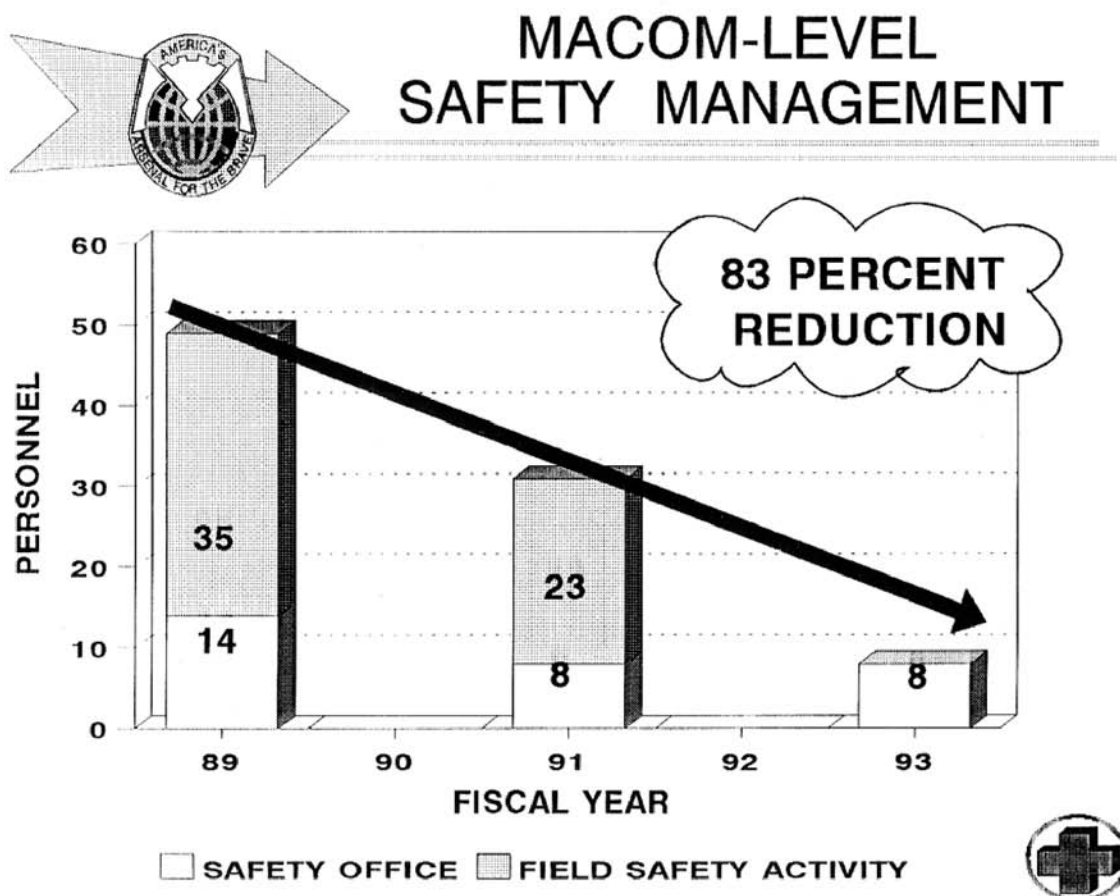


AMC has, for decades, maintained a comprehensive, leading edge safety program. The program is all encompassing in that it is infused into every aspect of AMC's mission. This means the program has two thrusts. One is directed inward, and addresses protection of AMC's operations, facilities, and work force. The other looks outward, and addresses

protection of soldiers, their equipment, and their mission. While no part of AMC's mission is beyond the scope of the safety program, several elements of the program have received emphasis and a large share of safety resources. These are safety program areas that are associated with high potential risks or liabilities, that have a high degree of public interest, or that have high visibility for other reasons. The need to thoroughly and aggressively manage those areas has not diminished in importance with downsizing the military in the post-cold war era. In fact, the social and political climate surrounding issues regarding hazardous materials and operations has never required a greater priority on protecting people and the environment.

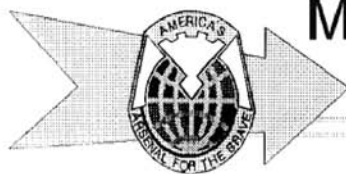
Another factor effects the need for vigilance in the ammunition and explosives safety arena. Although AMC has been decreasing in size, its ammunition stockpile has grown considerably because of returns from Europe and Southwest Asia and because AMC has received title to war reserve stocks worldwide. Perhaps more importantly, the ammunition demilitarization stockpile today consists of more than 400,000 short tons compared to less than 200,000 short tons in 1989.

CHART 4 -- Staff



AMC today is different in size and organization from the AMC of five years ago. At that time AMC employed over 100,000 civilian and 10,000 military personnel, and had a somewhat more extensive level of industrial activity. There were 49 people devoted to administrative and technical functions of the AMC safety program at the Headquarters, AMC level -- 15 in the headquarters Safety Office and 34 at the AMC Field Safety Activity (FSA) in Charlestown, Indiana. As AMC downsized by a little over 25 percent, the number of work-years devoted to safety has decreased more dramatically. In 1990, a reduction of the AMC headquarters (including FSA) decreased the safety staff by 37 percent. In 1992, the Field Safety Activity was closed. Some of its functions survived (16 work-years) which were transferred to other organizations (6 work-years to the AMC Safety Office, and 10 work-years to non-AMC activities). Five of the six spaces that transferred to HQ AMC were eliminated and one additional space in the AMC Safety Office was eliminated shortly thereafter. The result is that today the safety staff at the HQ AMC level is 83 percent below that in 1989. More than 3 of the work-years that transferred from FSA to HQ AMC were for explosives safety functions.

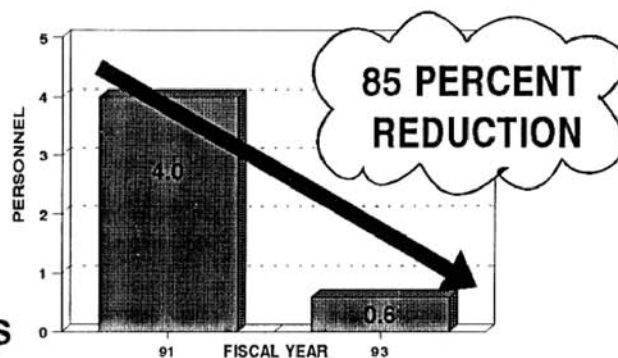
CHART 5 -- Explosives



MACOM-LEVEL EXPLOSIVES SAFETY FUNCTIONS

CONSOLIDATED AT HQAMC

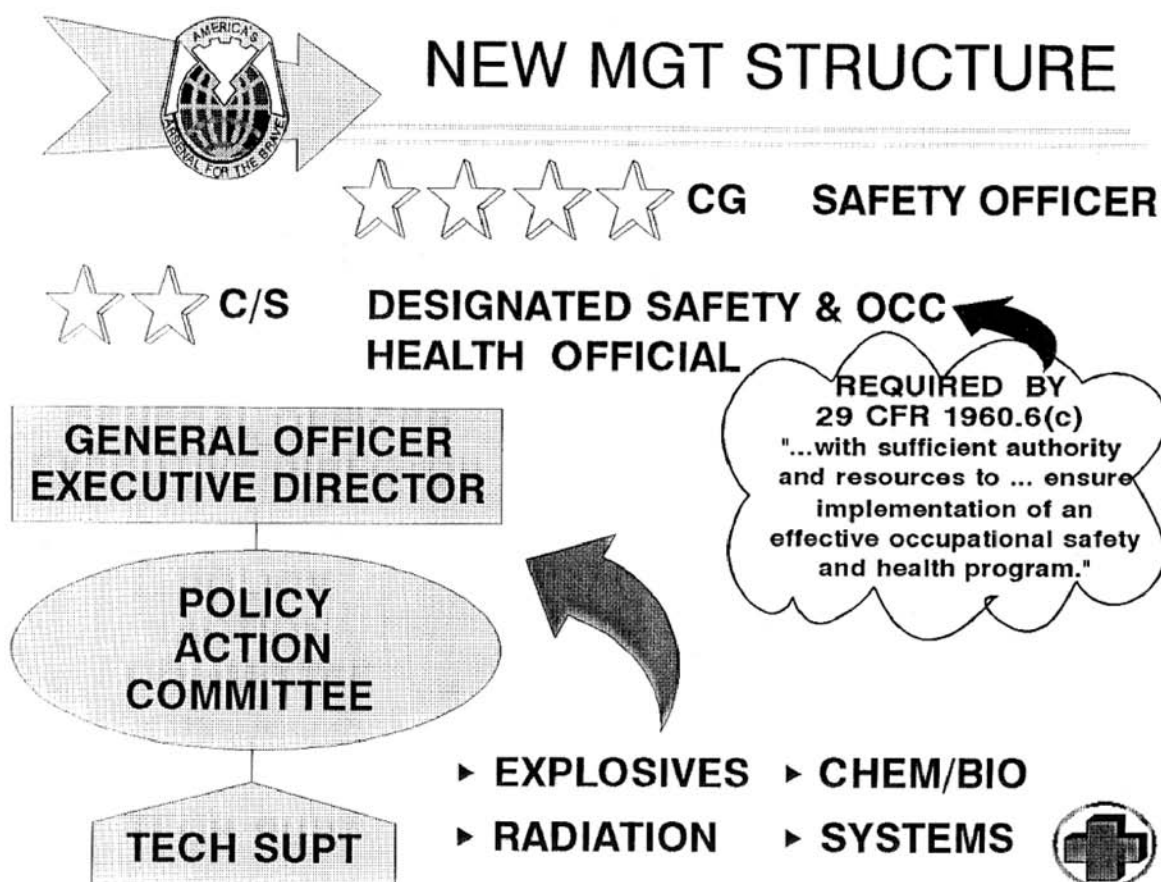
- o POLICY & REGULATIONS
- o PROGRAM EVALUATIONS
- o WAIVERS, EXEMPTIONS
- o BOI FINDINGS
- o CATEGORY "Z" STORAGE
- o SURFACE DANGER ZONES
- o ARMY FUZE SAFETY REVIEW BOARD
- o AMMUNITION & EXPLOSIVES SAFETY TRAINING
- o SITE PLAN PROCESS OVERSIGHT
- o RESPONSES TO EXTERNAL SURVEYS



The increase in mission and reduction of personnel resources necessitated the redistribution of duties among the remaining Safety Office personnel. As a result, 0.6 work years within the Safety Office remained available for explosives safety functions to which approximately 4 work years had been devoted. These functions remain essential to managing a comprehensive safety program. They include:

- Maintaining AMC explosives safety policy and regulations.
- Performing explosives safety program evaluations of AMC elements.
- Evaluating and preparing responses to requests for explosives safety waivers and exemptions.
- Tracking corrective actions in response to findings in Board of Investigation reports of explosives accidents, and publishing lessons learned.
- Evaluating and responding to requests for mixed compatibility ("Category Z") storage of ammunition and explosives.
- Developing procedures and methodology for determining surface and airspace danger zone dimensions, and approving proposed surface danger zones for specific weapon/ammunition configurations.
- Serving as the HQ AMC voting member of the Army Fuze Safety Review Board.
- Managing the AMC Safety and Occupational Health Management Career Program as related to developing AMC safety engineers and specialists qualified in ammunition and explosives safety, and monitoring the need for and availability/adequacy of explosives safety training for the AMC work force.
- Monitoring the AMC explosives facility site plan and final safety submission process.
- Tracking and reporting AMC actions in response to explosives safety related findings by external survey and inspection agencies.

CHART 6 -- Newmgt

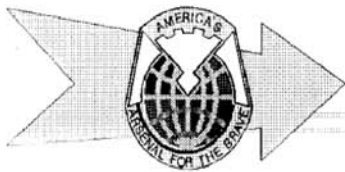


The personnel resources available within the AMC Safety Office were not sufficient to fully accomplish those explosives safety functions. The other AMC safety program areas were similarly effected by the severely reduced staffing level. A new approach to safety program management was needed that better integrated safety processes into primary mission areas of the command, flattened the traditional hierarchical structure of the AMC safety organization, empowered the safety process owners, and did not depend on a high concentration of specialized technical safety personnel at the HQ AMC level. In late 1992, the Chief, AMC Safety Office conceived and began to refine the AMC Safety Reshape Initiative, which was formally implemented by the Commanding General, AMC in early 1993. Affirming his role as the AMC Safety Officer, the Commanding General appointed the AMC Chief of Staff to serve as the AMC "Designated Safety and Occupational Health Official".

This appointment conforms with the Federal Agency occupational safety and health program criteria in Title 29, Code of Federal Regulations, 1960.6(c), requiring the designation of an official with sufficient authority and resources to ensure implementation of an effective program. In turn, the AMC Chief of Staff appointed General Officers to serve as AMC

Executive Directors to oversee each of four safety program emphasis areas -- explosives, radiation, chemical and biological, and system safety. Each Executive Director is supported by a policy action committee (PAC) of safety personnel representing the AMC elements having missions in the respective safety program emphasis area. Also, one or more sources of technical support are identified in each emphasis area to advise and assist the PAC.

CHART 7 -- APfctns



AMMOPAC FUNCTIONS

- ▶ **AMC POLICY**
- ▶ **AMC POSITION - DA POLICY**
- ▶ **ID EXPLOSIVES SAFETY ISSUES**
- ▶ **CHARTER PATS, AHWG**
- ▶ **REVIEW BOI REPORTS - LESSONS**
- ▶ **FORUM - INFO EXCHANGE**
- ▶ **PROGRAM OVERSIGHT, EVALUATION**



The AMC Chief of Staff appointed the AMC Deputy Chief of Staff for Ammunition as the AMC Executive Director for Explosives Safety (AMCEDES) on 14 May 1993. The AMCEDES established the AMC Ammunition and Explosives Safety Policy Action Committee (AMMOPAC) which first convened on 20 July 1993. The membership consists of representatives from the:

- HQ AMC Safety Office
- HQ AMC Deputy Chief of Staff for Ammunition

- U.S. Army Armament, Munitions, and Chemical Command.
- U.S. Army Research Laboratory
- U.S. Army Chemical and Biological Defense Command
- U.S. Army Depot System Command
- U.S. Army Missile Command
- U.S. Army Test and Evaluation Command
- The AMC Project Manager for Ammunition Logistics

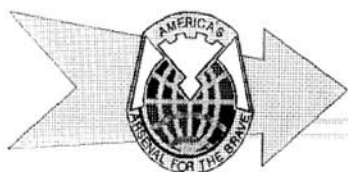
The AMMOPAC receives technical support from the U.S. Army Technical Center for Explosives Safety (USATCES). Recently, a member was added representing the U.S. Army Armament Research, Development, and Engineering Center due to organizational realignments within AMC.

The charter functions of the AMMOPAC include:

- Developing AMC explosives safety policy.
- Developing the AMC position on draft Department of the Army safety policies.
- Identifying AMC explosives safety issues.
- Chartering process action teams and ad hoc working groups (AHWG) to study specific issues and recommend actions to the AMMOPAC.
- Reviewing Board of Investigation Reports of explosives accidents, determining the need for policy changes, and publishing lessons learned.
- Serving as a forum for safety information exchange among AMC elements.

The members have agreed that AMMOPAC functions shall also include performing on-site evaluations of MSC and installation explosives safety programs and selected operations as requested by the MSCs or deemed appropriate by the AMMOPAC.

CHART 8 -- Actns



AMMOPAC ACTIONS

- ▶ **AR / DA PAMPHLET 385-64, EXPLOSIVES SAFETY**
- ▶ **AR / 386-63, RANGE SAFETY**
- ▶ **AMC SUPPL1 TO AR 385-40, ACC INVEST / REPORTING**
- ▶ **AMCR 385-100, SAFETY MANUAL**
- ▶ **WAIVERS, EXEMPTIONS, RISK MANAGEMENT CRITERIA**
- ▶ **SITE PLAN / SAFETY SUBMISSION PROCESS REVIEW**
- ▶ **EXPLOSIVES SAFETY PROGRAM EVALUATIONS**



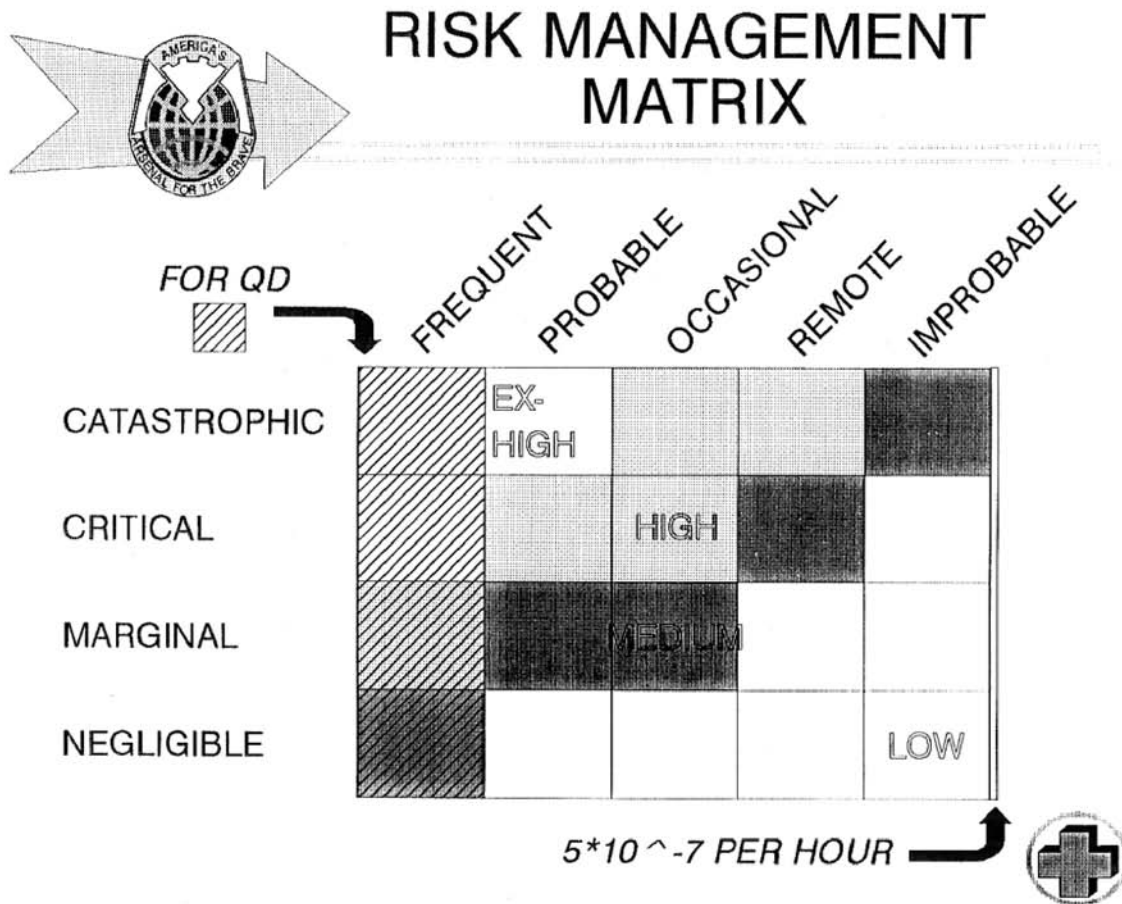
The AMMOPAC has convened seven times. Meetings have averaged two days in duration and to date have included several intensive working sessions devoted to developing the text of DA or AMC regulatory documents. AMMOPAC actions completed or in process are briefly summarized as follows:

- In August 1993, the Director of Army Safety distributed a new draft Army Regulation and Department of the Army Pamphlet (AR 385-64 and DAP 385-64) addressing explosives safety. These draft documents contained substantial new safety program requirements and explosives safety standards. The AMMOPAC offered HQDA the text of 123 recommended changes, all of which have received favorable disposition, except for one issue regarding operational risk management that all parties have agreed requires refinement. Several concepts that have derived from the AMMOPAC's continuing work on that subject are offered in this paper for general consideration by the explosives safety community.
- The AMMOPAC members reviewed and generated 80 recommended changes to a

proposed new Army Regulation on range safety associated with firing weapons.

- The AMMOPAC prepared a comprehensive revision of AMC-R 385-100, the AMC Safety Manual. The revision eliminates text that duplicates or conflicts with the new AR / DAP 385-64. The draft AMC regulation is in the staffing process.
- The AMMOPAC is evaluating the processes in place within the MSCs for responding to explosives accidents and convening Boards of Investigation. The objective is to establish a standard process having the best features of each MSC's approach. The AMMOPAC will offer text for incorporation in AMC's supplement to a new AR 385-40 on accident investigation, reporting and analysis. In connection with this effort, the AMMOPAC will reinstate a former FSA function of publishing accident abstracts (electronic versus paper publication).
- In late 1992, in view of the impending closure of FSA, HQ AMC delegated its approval authority for facility site plans and safety submissions to the MSCs. In February, 1993, the USATCES hosted a meeting among the USATCES action officers who perform DA level reviews and representatives of HQ AMC and the MSC Safety Offices. The purpose was to address common technical and procedural issues surfaced by USATCES. The participants unanimously agreed that the meeting was of great benefit. The AMMOPAC and USATCES have agreed to reconvene annually for similar reviews, and last met for the purpose in June 1994.
- The AMMOPAC has assigned members to serve on an AHWG to develop a concept of operation for MSC and installation explosives safety program evaluations. The AHWG will conduct a trial evaluation in September, 1994 and propose an AMMOPAC charter revision to formally add this function shortly thereafter.
- The AMMOPAC has compiled a listing of active AMC waivers and exemptions from military-unique explosives safety requirements. Upon publication of AR / DAP 385-64, and finalization of AMC-R 385-100, the AMMOPAC will complete a revalidation of all approved deviations. This endeavor is expected to be directly affected by new risk management criteria in AR 385-64 that will prescribe the organizational levels at which commanders may accept operational risks. The AMMOPAC has been working with HQDA to refine an approach. This work is at the heart of the Reshape philosophy because it promises a credible and defensible basis for empowering the subordinate commands and installations.

CHART 9 -- Matrix



The AMMOPAC has assigned members to serve on an AHWG to study hazard analysis requirements and possible quantitative risk acceptance criteria, and to present recommendations to the AMMOPAC regarding text for incorporation into AMC-R 385-100. The following discussion does not air any contentious issue pertaining to policy development work in process. It simply explains two concepts derived from AHWG work regarding this subject which the author believes may be of general interest to the explosives safety community. They are pertinent here because they exemplify subjects of AMMOPAC deliberation.

There are at least two possible applications of a policy governing operational risk management in an explosives safety program context. One provides for decisions regarding the acceptability of residual operational risks identified through hazard analyses but not eliminated from an operation. Another provides for decisions regarding the acceptability of deviating from military-unique explosives safety standards. Both applications are contemplated in this discussion. Furthermore, this discussion presumes there are two elements of a prospective risk management policy. One is a methodology for defining the

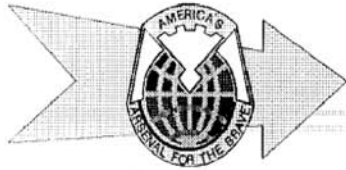
level of risk associated with a particular operation. The other is a scheme that specifies the persons or positions in which risk acceptance authority may be vested as a function of the level of risk. This discussion does not propose any specific DA or AMC approval officials.

One method for defining levels of operational risk is the qualitative frequency-severity matrix promulgated by the U.S. Army Safety Center to support risk decisions by field commanders. The approach maps four regions with definitions ranging from "extremely high" to "low". These regions can serve as the basis for prescribing risk acceptance authorities. The AHWG favors this approach, and notes that it has been adopted in the DA chemical safety policy, with which consistency is desirable. The AHWG also favors retention of an older quantitative risk acceptance criteria associated with hazard analysis policy. That older policy requires that the potential for a catastrophic or critical event be eliminated or controlled to a probability not greater than 5×10^{-7} per hour of operation. Exceeding that probability would constitute deviation from the policy, and would therefore require a waiver or exemption. Waiver authority was not addressed in the hazard analysis regulation. The AHWG believes the two approaches are appropriately reconciled by defining the right border of the matrix as 5×10^{-7} per hour. Some operations will require quantitative hazard analysis. If a residual hazard probability does not exceed the quantitative limit, the residual risk is acceptable by definition. If the limit is exceeded, the hazard falls on the matrix, meaning that some specified authority must accept the risk. If a residual risk is identified by qualitative hazard analysis, the hazard probability is presumed to exceed the quantitative limit, and only the proper authority specified for the applicable matrix region may accept the risk. The AHWG does not favor quantifying frequency or severity boundaries within the matrix.

The other concept offered here pertains to the prospective use of the risk management policy for acceptance of deviations from quantity-distance (QD) standards. The AHWG believes that most QD standards accept some potential for damage or injury. That potential is accepted because the probability of an accidental explosion is extremely remote. If the operation involves a higher probability of an explosive reaction, greater protection is needed. The AHWG therefore does not believe lower level risk acceptance authorities should be permitted to waive QD standards based on the contention that the risk is low because of low probability of an explosion. The AHWG has recommended that the risk associated with a QD deviation be derived based on the conservative presumption that the accidental explosion will occur. This constrains the analyst to the left column of the matrix for QD deviations.

The AMMOPAC will continue to work with HQDA in this subject area. Some form of the preceding concepts will probably be reflected in the ultimate AMC policy. The AMMOPAC welcomes comments from any source. Readers may offer comments to the AMMOPAC through the author by writing to Commander, U.S. Army Materiel Command, ATTN: AMCSF, 5001 Eisenhower Avenue, Alexandria VA, 22333-0001.

CHART 10 -- Advntg



RESHAPE ADVANTAGES

- ▶ DESIGNATES GENERAL OFFICER AS CHAMPION
- ▶ INCREASES VISIBILITY OF SAFETY
- ▶ CAPITALIZES ON EXISTING RESOURCES
- ▶ EMPOWERS EXPERTS TO DEVELOP POLICY
- ▶ FACILITATES CONSENSUS BUILDING
- ▶ TAPS COLLECTIVE EXPERTISE
- ▶ FOSTERS PROGRAM CONSISTENCY



In the last year, the AMC explosives safety program has been enhanced in stature and visibility by virtue of having a General Officer as a champion. The AMMOPAC brings existing personnel resources to bear on AMC-wide issues for which headquarters level resources no longer exist and will not likely be reinstated. The AMMOPAC empowers safety process owners to develop process improvements through policy changes. The face-to-face team approach to policy development has been a particularly efficient vehicle for achieving consensus from initially divergent positions. Since the collective knowledge and experience of the AMMOPAC membership is immediately available to address issues, solutions readily surface. Finally, the AMMOPAC deliberations promote consistency in the member organizations' programs. In summary, the AMC Reshape Initiative has proven to be an unqualified success in addressing most of the HQ AMC level explosives safety functions.